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# Internal hernia following laparoscopic colorectal surgery: single center experience

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## ABSTRACT:

Although internal hernias are rare complications of laparoscopic colorectal surgery, they can lead to serious outcomes and are associated with a high mortality of up to 20 %.

**Aim of the study:** The aim of this study was to describe our experience regarding internal herniation following laparoscopic colorectal surgery.

**Materials and methods:** From 2009 to 2015, more than 1,093 laparoscopic colorectal procedures were performed, and 6 patients developed internal herniation. Data were obtained from patients' charts and reviewed retrospectively. Perioperative course and outcomes were analyzed.

**Results:** All patients were previously operated due to colorectal cancer. Two patients presented with ischemia at laparotomy, and 2 had endoscopic examinations before surgery. One patient was diagnosed with cancer on screening colonoscopy. One patient died after laparotomy.

**Conclusion:** Internal herniation that develops following laparoscopic colorectal surgery may be associated with a high mortality. More efforts should be made to identify risk factors of internal herniation, as this could indicate which patients would benefit from closure of mesenteric defects during laparoscopic colorectal surgery.

## KEYWORDS:

internal hernia, laparoscopic colectomy, small bowel obstruction, volvulus, colorectal surgery

## INTRODUCTION:

The clinical presentation of internal herniation (IH) ranges from mild and intermittent abdominal cramping to small bowel obstruction (SBO), which may lead to bowel strangulation (1). IH occurs when the small bowel herniates through the defects in the intermesenteric spaces, which leads to SBO (2). SBO can occur in 2%-3.6% of patients up to 3 years after laparoscopic colorectal resection (3).

Recently, some authors reported SBO due to IH after laparoscopic colorectal surgery (LCRS) (2-6). This rising trend can be seen because laparoscopic colorectal surgery is now performed commonly worldwide. IH following laparoscopic colorectal surgery has an incidence of approximately 1%, and the mortality is approximately 20 % (3,7), which is almost as high as the mortality following anastomotic leakage (AL) (8,9). The laparoscopic approach for colorectal surgery has become more common worldwide due to several advantages such as pain reduction, improved wound healing, better recovery, and comparable oncologic results (10,11). There have been no clear indications that an increasing number of laparoscopic colorectal procedures may result in a higher incidence of IH. In the present study, we describe our experience regarding IH following laparoscopic colorectal surgery.

## MATERIAL AND METHODS:

More than 1,093 laparoscopic colorectal procedures were performed in our institution between 2009 and 2015. All patients who underwent laparoscopic colorectal surgery were reviewed retrospectively, and 6 documented cases of IH were identified. We performed a retrospective analysis of patient characteristics, perioperative data, outcomes, and mortality.

## RESULTS:

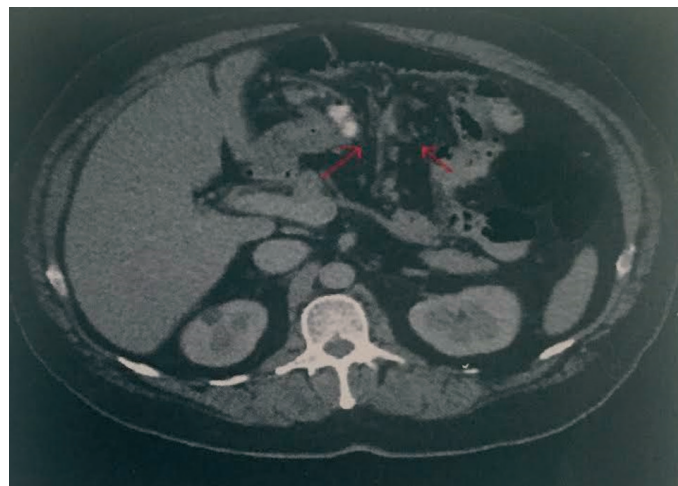
All patients were previously operated for colorectal cancer (CRC). Three patients had laparoscopic right hemicolectomy, 2 had laparoscopic left hemicolectomy, and 1 patient had laparoscopic colon sigmoid resection (Table 1). Two patients presented with bowel ischemia at reoperation (Figure 1). One patient was diagnosed with CRC on screening colonoscopy. Symptoms varied from mild discomfort, vomiting, and absence of bowel function to diffuse abdominal pain. Patients were diagnosed with IH between 3 and 82 months after the index operation with a median of 38 days. Five of 6 patients had a preoperative workup that showed bowel obstruction, and one patient had colonic volvulus (Figure 1 and Table 2); all cases were managed by an open approach. One patient underwent endoscopic desufflation just three times before reoperation due to a suspicion of colonic volvulus. Another patient underwent sigmoidoscopy due to a suspicion of colonic ileus, which revealed bowel necrosis, and then laparotomy was performed. All patients recovered well, except for one patient with several comorbidities who developed severe postoperative medical complications including nephrotic syndrome, renal failure, and lung edema. This patient did not respond to therapy, and died 5 days postoperatively due to multi-organ failure.

## DISCUSSION:

The real incidence of IH following LCRS is unknown. To date, the majority of studies were retrospective and consisted of case reports or case series. Diagnosing IH can be difficult due to varying symptoms ranging from significant discomfort or constant vague pain to intermittent diffuse abdominal pain mimicking AL. A recent report by Toh et al. suggested that the incidence of IH or volvulus was low (0.65%), which is comparable with our incidence rate of 0.55 %



**Fig. 1.** Intraoperative image of a mesenteric defect, indicated by the forceps, that permitted internal herniation of the small bowel and torsion near the anastomosis after laparoscopic right hemicolectomy



**Ryc. 2.** CT image of retrocolic, transmesenteric hernia. The neck of the herniating small bowel sac is shown with a red arrow.

**Tab. I:** Patient characteristics and perioperative data

INITIAL OPERATION	TIME TO REOPERATION	SEX	SYMPTOMS AND SIGNS	COMORBIDITY	CT FINDINGS	ENDOSCOPY	RE-OPERATION
Laparoscopic left colectomy	7 years	F	Meteorism, abdominal pain, and vomiting	Myxedema, hiatal hernia, spinal stenosis	SBO and mesenteric findings	No	Closure of mesenteric defect
Laparoscopic sigmoid resection	5 years	F	No bowel function for 4 days, abdominal pain, nausea, and vomiting	Depression Arthrosis	Colonic ileus, dilation of the caecum to 9 cm.	Yes	Right hemicolectomy, closure of mesenteric defect, stoma
Laparoscopic left colectomy	71 days	F	Intermittent abdominal pain, vomiting	None	Free fluid and volvulus	Yes	Right hemicolectomy, closure of mesenteric defect
Laparoscopic right colectomy	5 days	M	No bowel function for 3 days, Abdominal pain, vomiting, and meteorism	Deep venous thrombosis	Free air and fluid	No	Closure of mesenteric defect
Laparoscopic right colectomy	3 days	F	Abdominal pain, vomiting, and nausea	None	SBO	No	Closure of mesenteric defect
Laparoscopic right colectomy	6 days	M	Abdominal pain	None	Not done	No	Closure of mesenteric defect

Abbreviations:

F=female, M=male, SBO=small bowel obstruction

(6/1093) (7). Most reported cases of IH occurred early in the post-operative period (3); in contrast, our series shows that IH can develop several years after laparoscopic operations. Thus, SBO due to IH must be kept in mind even several years after the primary operation. Only two patients developed IH within 10 days of primary surgery. Lack of IH awareness can lead to misdiagnosis or delayed diagnosis and treatment, with consequent significant morbidity and mortality.

In suspected cases, IH can also be demonstrated radiographically on either conventional X-rays, or more frequently, on computed tomography (CT). On CT, IH is characterized by mesenteric vessel abnormalities such as vessel crowding, twisting, and stretching. The bowel loops may be distended or located in the hernia sac/mesenteric defect (12) (figure 1). Abdominal imaging including GI series with barium enema may also be helpful (12). In our series of patients, CT was generally not contributive in making the diagnosis of IH, and the clinical course was more important. Most of our CT findings showed dilation of small bowel loops; however, when imaging does not suggest SBO, it does not exclude the presence of IH.

Bowel ischemia is the most severe presentation of IH with a mortality of 20-50 %. (3,12). Interestingly, 2 of 6 patients had endoscopic examinations due to a suspicion of volvulus and colonic ileus before surgery for IH, and this has not been described previously. One IH case developed following colonoscopy screening. Therefore, it can be argued that the need for endoscopy following LCRS should raise the suspicion of IH. Fewer adhesions after LCRS potentially increase the risk of IH through the mesenteric defect. Repositioning and tilting of patients during LCRS and early post-operative mobilization may also increase that risk. Mobilization of the ligament of Treitz and splenic flexure have been described as risk factors for left-sided resections. However, mesenteric defects were not routinely closed during initial LCRS. Although routine closure of mesenteric defects has been suggested by some authors, closure attempts during LCRS can be technically difficult and time-consuming. In addition, incomplete closure may leave a narrow residual defect that could paradoxically increase SBO risk, and it should be kept in mind that closure could compromise perfusion of anastomoses. In laparoscopic gastric bypass surgery, the incidence of IH is approximately 4 %, and the benefit of closing the

mesentery has been documented (13). However, IH is secondary to weight loss; therefore, these results cannot be translated directly to colorectal surgery. Moreover, it could be argued that IH is not a well-described complication following LCRC, leading to a low IH awareness among doctors..

The majority of patients with IH underwent defect closure with continuous suturing. However, re-operations can be complex and can require bowel resections as in our two patients with late onset IH. Our study was limited by a small number of patients and a retrospective evaluation. Our small series of patients does not give solid evidence to support routine closure of the mesentery in all patients; nevertheless, such closure should be considered in high-risk patients (7). Surgeons who perform LCRC must be

aware of the IH risk when patients present with symptoms of ileus or recurrent ileus.

## CONCLUSION:

IH is a rare but important complication of laparoscopic colorectal surgery with a high mortality rate. IH should be suspected when patients do not recover as expected. Defect closure is still controversial during the initial surgery and probably not indicated for all patients. More efforts should be made to identify risk factors of IH, as this could indicate which patients would benefit from closure of mesenteric defects during laparoscopic colorectal surgery. There is a need for comparative studies based on robust data.

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